

REMARKS/ARGUMENTS

Favorable reconsideration of this application, as presently amended and in light of the following discussion, is respectfully requested.

Claims 1-40 and 42-45 are presently active in this case, Claims 1 and 30 amended, and Claim 16 canceled by way of the present amendment.

In the outstanding Office Action, Claims 1-9 and 39 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent Publication 2002/0125240 to Ogura et al. in view of U.S. Patent No. 5,231,690 to Toya et al.; Claim 16 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Ogura et al. and Toya et al., and further in view of U.S. Patent No. 6,688,375 to Turner et al.; Claim 17 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Ogura et al. and Toya et al., and further in view of U.S. Patent No. 6,919,538 to Szekeresch et al.; Claim 29 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Ogura et al. and Toya et al., and further in view of U.S. Patent No. 6,106,628 to Takahashi et al.; Claims 30 and 31 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Ogura et al., Toya et al., and Takahashi et al., and further in view of Szekeresch et al.; and Claim 45 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Ogura et al., Toya et al., and further in view of U.S. Patent No. 6,353,209 to Schaper et al..

First, Applicants wish to thank Examiner Dhingra for the May 31, 2007 discussion at which time the outstanding issues in this case were discussed. During the discussion, Applicants presented amendments and arguments substantially as contained herein. While no agreement was reached, Examiner Dhingra indicated that including the features of Figures 2A and 2B within independent Claim 1 would move this case closer to allowance, but further consideration would be necessary upon formal filing of a response.

Turning now to the merits, as discussed in the Response filed March 22, 2007, Toya et al. does not disclose a heating element including a carbon fiber sealed in a tube and provided within a groove of a substrate holder as required by Claim 1. In response, the Office Action takes the position that Figures 37A, 37B and 38A and Figs. 78-81 disclose these features. Applicants note however, that Figures 37A, 37B and 38A of Toya et al. merely show a carbon fiber tube assembly that is coiled in a cylinder shape such that the assembly can be provided in a cylindrical chamber for indirect heating of substrates. Further, as discussed in the March 22<sup>nd</sup> response, Figs. 78-81 show a carbon heater 510 including an upper container 512 and a lower container 511 that come together to form a disk shaped carbon heater 510 that seals a carbon fiber therein, rather than sealing a fiber and tube assembly therein as required by Claim 1. Thus, Applicants maintain that Toya et al. does not disclose a heating element including a carbon fiber sealed in a tube and provided within a groove of a substrate holder as required by Claim 1.

Nevertheless, in order to expedite issuance of a patent in this case, Applicants have amended independent Claim 1 to further clarify patentable distinctions of the present invention over the cited references. Specifically, Applicants have amended Claim 1 to recite a substrate holder including a wafer heating assembly having a holding device with a wafer support surface comprising quartz and having raised portions thereon which are configured to support a wafer. As noted in Applicants' specification these raised portions can allow a wafer transfer mechanism (fork) to translate between the substrate and the top surface of the substrate holder, and lift the substrate off the substrate holder or lower the substrate onto the substrate holder.<sup>1</sup> The substrate holder of Claim 1 also includes a thermal barrier adjacent to a backside of the holding device, the thermal barrier including a thermally variable material and a reflecting surface facing the plurality of heating units. As discussed in Applicants'

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<sup>1</sup> See Applicants' specification at paragraph 67.

specification, the thermal barrier isolates the heating unit from a cooling unit, and the reflecting surface of the thermal barrier improves heat efficiency of the heating unit by reflecting heat rays radiated from the heater element.<sup>2</sup> The claimed substrate holder also includes a cooling unit coupled to the backside of the holding device such that thermal barriers interposed between the cooling unit and the heating unit, the cooling unit configured to cool the wafer. Finally, the substrate holder of amended Claim 1 also includes a coupling unit coupled to the cooling unit and configured to mount the substrate holder to a processing chamber and having a lower thermal conductivity than the heating assembly and cooling unit.

Thus, as discussed in the May 31<sup>st</sup> telephone discussion, Applicants have amended Claim 1 to include several detailed features of a substrate holder, examples of which are shown in Figures 2A and 2B of Applicants' specification. As discussed in Applicants' specification, the recited combination provides a substrate holder that can have an extremely wide operating range, an extremely fast temperature response and excellent transfer characteristics, making it suitable for a variety of applications.<sup>3</sup> Further, the chamber can be cleaned without opening the chamber since it has such a wide operating temperature range.<sup>4</sup>

In contrast, the cited reference to Ogura et al. discloses a chuck having a conventional resistance heater therein. However, this reference does not disclose any details of a substrate holder assembly, let alone the combined features of a substrate holder assembly as now recited in amended Claim 1. Although the secondary reference to Toya et al. discloses a carbon fiber heater generally, this reference also does not disclose details of a substrate holder assembly. In fact, each embodiment disclosed in Toya et al. is directed to indirectly heating a wafer by placing the heating unit in a chamber wall or lid.<sup>5</sup> The only discussion of wafer heating is provided in relation to Figure 61 of Toya et al., which discloses that the

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<sup>2</sup> See Applicants' specification at paragraph 59.

<sup>3</sup> See Applicants' specification at paragraph 73.

<sup>4</sup> See Applicants' specification at paragraph 72.

<sup>5</sup> See, for example, col. 41, lines 55-67 and col. 56, lines 30-40, explaining indirect heating arrangements.

carbon heater 220 is provided separately from the substrate holder 283. Thus, Toya et al. also does not disclose the combined features of the substrate holder now recited in Claim 1.

Therefore, Applicants' independent Claim 1, as amended, patentably defines over the cited references to Ogura et al. and Toya et al. Moreover, the remaining cited references to Szekeresch et al., Takahashi et al. and Schaper et al. are cited for teachings of features within the dependent claims and do not correct the deficiencies noted above. In this regard, Applicants note that the combined features of a (1) the holding device with a wafer support surface comprising quartz and having raised portions thereon which are configured to support a wafer, (2) a thermal barrier adjacent to a backside of the holding device, the thermal barrier including a thermally variable material and a reflecting surface facing the plurality of heating units, (3) a cooling unit coupled to the backside of the holding device such that thermal barriers interposed between the cooling unit and the heating unit, the cooling unit configured to cool the wafer, and (4) a coupling unit coupled to the cooling unit and configured to mount the substrate holder to a processing chamber and having a lower thermal conductivity than the heating assembly and cooling unit, were not previously recited in a dependent claim. As noted above, this combination of features provides a substrate holder that can have an extremely wide operating range, an extremely fast temperature response and excellent transfer characteristics, as well as providing chamber cleaning without opening the chamber. The combined cited references cannot provide these advantages.

Therefore, Applicants' independent claim patentably defines over the cited references. As Claims 2-39 and 45 depend from Claim 1, these claims also patentably define over the cited references.

Consequently, in view of the present amendment, no further issues are believed to be outstanding in the present application and the present application is believed to be in

condition for formal allowance. An early and favorable action is therefore respectfully requested.

Respectfully submitted,

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